

W. C. WILCOX.
Steam-Engine.

No. 159,733.

Patented Feb. 9, 1875.

Fig. 1.

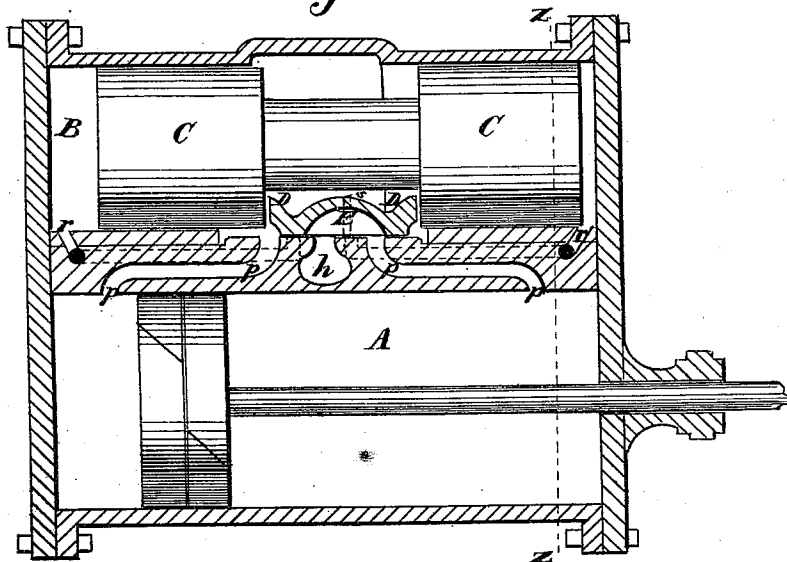
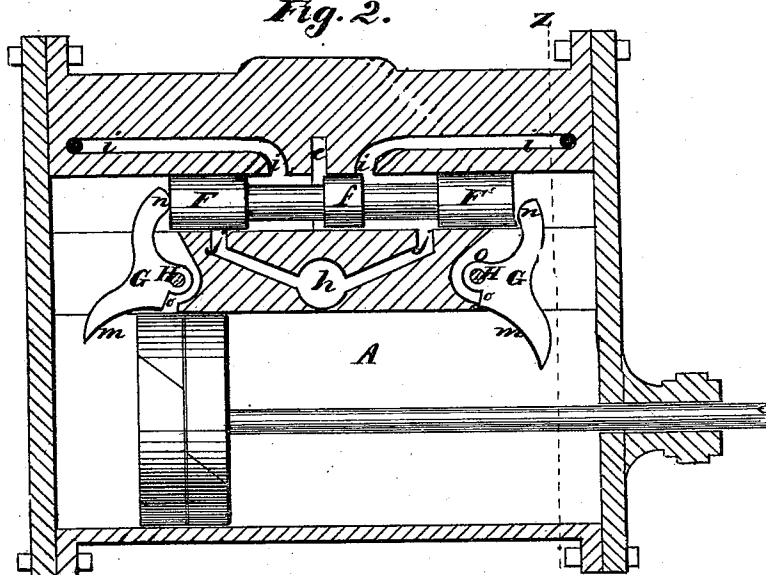


Fig. 2.



Witnesses

H. D. Bacon
E. M. Richardson

Inventor

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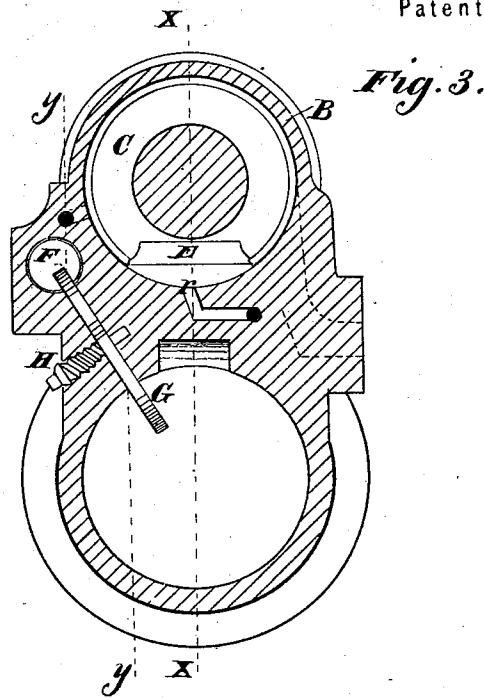


Fig. 4.

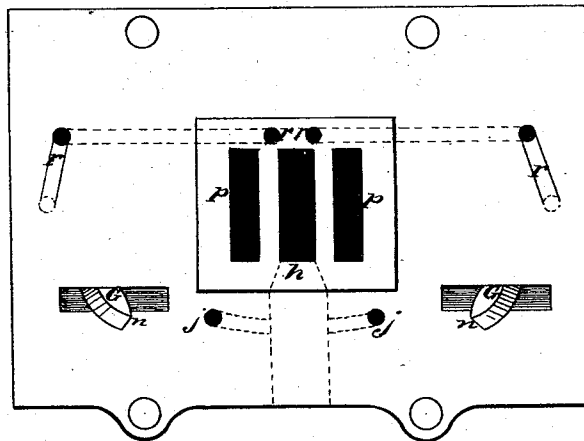


Fig. 5.

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William C. Wilcox

UNITED STATES PATENT OFFICE.

WILLIAM C. WILCOX, OF SAN FRANCISCO, CALIFORNIA.

IMPROVEMENT IN STEAM-ENGINES.

Specification forming part of Letters Patent No. 159,733, dated February 9, 1875; application filed June 1, 1874.

To all whom it may concern:

Be it known that I, WILLIAM C. WILCOX, of San Francisco city and county, State of California, have invented Improvements in Direct-Acting Steam-Engines; and I do hereby declare the following description and accompanying drawings are sufficient to enable any person skilled in the art or science to which it most nearly appertains to make and use my said invention or improvement without further invention or experiment.

My invention relates to certain improvements in direct-acting steam-engines, which are provided with a main and supplementary valve, and a supplementary piston to operate the main valve; and it consists in the employment of two ports for the admission of steam from the main valve-chamber to a point behind the supplemental piston, for the purpose of cushioning this piston, and the combination of these ports with a passage in the valve itself, whereby the steam is supplied and cut off at the proper points.

Referring to the accompanying drawing for a more complete explanation of my invention, Figure 1, Sheet 1, is a longitudinal vertical section taken through *xx*, Fig. 3. Fig. 2 is a longitudinal section through *yy*. Fig. 3, Sheet 2, is a transverse vertical section through *zz*, Fig. 1, also showing a section of piston C. Fig. 4 is a plan view of valve-face. Fig. 5 is a top view of valve.

A is the cylinder of my engine, and in a direct line above it is situated the cylinder B of the supplemental piston C. This supplemental piston is cylindrical, and fits its cylinder so as to move steam-tight from one end to the other, its length being such as to necessitate a short stroke. In the center this piston is made somewhat smaller, and the corners D D upon the main valve E fit between the end portion of the piston, so that the stroke of the piston serves to move the valve E, and alternately open and close the steam and exhaust ports for the main cylinder.

My supplemental piston, being cylindrical, is allowed to turn itself into any position, and consequently all portions of it will be equally subjected to wear, and it will have a tendency to remain tight for a long time.

In order to drive this piston C and the main

valve, steam is admitted to the ends alternately from the steam space or chamber which surrounds its center, and lies above and around the main valve. This is done by means of a supplemental valve, F, which works in a chamber just at one side of the main valve-chamber. A slot or opening admits steam from the main valve-chamber to the center of the valve F, which consists of a cylinder having each end and the center fitted steam-tight, and united by smaller portions, around which the steam can pass freely. An exhaust and steam port open into this valve-chamber at each side of the middle section of the valve, and, as the valve is moved, it allows steam to pass alternately to one side and the other of the middle part, *f*, so as to enter the chamber and circulate around the smaller part or stem of the valve. The steam-ports *i i* supply this admitted steam alternately to the ends of the supplemental piston C, and the exhaust-ports *j* are also opened alternately from the opposite ends of the piston, in the usual manner. This supplemental valve F is operated partly by means of peculiarly-constructed levers directly from the main piston, and partly by steam, which is admitted to drive the main piston. The levers G G are made as shown at Fig. 2, and are hung in open angular slots upon pins H, which are screwed through the side of the cylinder, just above the bore. The slots in which the levers are hung open freely into the ends of the cylinder, and also into the ends of the chamber of the valve F, and they are made angularly, so that the levers stand radially from the center of the cylinder, in order to allow the piston to act in a direct line upon them, as will be necessary from their peculiar motion. The lower face, *m*, of the lever-arm is made concave, as shown, so that when the edge of the piston slides beneath it, the movement will be a gradually-increasing one, and the valve will be started slowly, and move more rapidly toward the finish. The end *n* of the lever, which rests against the end of the valve F, is made convex, so as to have a sort of rolling contact with the valve as it is moved forward, and as the center of motion *o* of the lever is set forward of a line between the ends, it will be seen that the lever will have a sort of lifting motion as it is moved. When the

pressure is taken off the lower end of the lever, it will fall back by its own weight and release the valve. In order to cushion the supplemental piston C, and prevent it from striking the ends of the chamber, I provide two ports, *r r*, which open into the end of the chamber, and lead thence to the valve-face at one side of the main valve-ports P P. A small hole, S, is made through the main valve E, and as this valve is moved, it admits steam into the ports *r r* alternately, just before the piston reaches the end of its stroke.

The operation of my engine will be as follows: Steam, being admitted to the engine, will surround the central portion of the supplemental piston C, and fill the space above the main valve E. The supplemental valve F F' being thrown to one end of its chamber, steam will enter the chamber between the center *f* and the end F, and from here will be allowed to pass through the port *i* to one end of the supplemental piston C, thus driving it to the other end of its chamber, and carrying the valve E with it. The exhaust-port *j* being also open, the steam from the other end of the supplemental piston will escape into the main exhaust-port *h*, until the piston C has nearly completed its stroke, when the portion *f* will have closed the port *i* and allow the cushion to act. Meanwhile, the main valve E has opened the main steam-port P, and steam rushes into the cylinder A, driving the main

piston to the opposite end of the cylinder, where it acts upon the lower end of the lever G, and begins to force the valve F back again. This closes the exhaust-port *j*, and at this instant the valve E has moved so far as to open the cushion-port *r*. This admits a jet of steam before the supplemental piston, which arrests its motion and cushions it. The return movements are made in the same manner, and thus the engine works.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The ports *r r*, opening into the ends of the supplemental piston-chamber, and leading to the main valve-face, in combination with the main valve, with its port S, for the purpose of admitting steam to cushion the supplemental piston, substantially as herein described.

2. The valve F F', with its central enlargement *f*, in combination with the single supply-port *e*, for admitting steam to the center of the valve, and the steam-ports *i*, exhaust-ports *j*, and the operating-levers G, substantially as and for the purpose herein described.

In witness whereof I hereunto set my hand and seal.

WILLIAM CAMPBELL WILCOX. [L. S.]

Witnesses:

H. D. BACON,

C. M. RICHARDSON.